

DOCUMENT RESUME

ED 224 674

RC 013 731

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TITLE How to Build a School: The Process of Capital Funding.
INSTITUTION Ontario Indian Education Council, Toronto.
PUB DATE Mar 82
NOTE 28p.
PUB TYPE Guides - Non-Classroom Use (055)
EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Administrator Guides; *Canada Natives; *Capital Outlay (for Fixed Assets); Cost Effectiveness; *Federal Regulation; Foreign Countries; Government School Relationship; Guidelines; *School Buildings
IDENTIFIERS *Canada

ABSTRACT

The guide is intended to simplify and identify procedures taken by the federal government to approve, construct, and evaluate a Department of Indian Affairs capital school building project. The approach involves extracting the basic information provided in a number of government publications and dividing the various elements into specific chapters. The first chapter explains how the Prime Minister and his Cabinet determine where and why the money goes to each department. Chapter 2, building a school, is divided into the following specific topics: project identification, project planning, design phase, construction phase, tender, day labour plan, construction, and evaluation. The final chapter explains the concept of benefit-cost analysis or, in other words, whether the benefits of building a school on a given reserve are equal to or greater than the costs. The guide stresses that the reader keep in mind that the descriptions of stages are stripped to their simplest levels and that what is presented is how the process of decision-making should occur in theory. (AH)

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HOW TO BUILD A SCHOOL:
THE PROCESS OF CAPITAL FUNDING

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TORONTO, ONTARIO
MARCH, 1982

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ACKNOWLEDGEMENT

I would like to thank Dr. David Stager of the University of Toronto for his help on the section on Benefit-Cost Analysis. I would also like to thank Merv Dewasha, Vince Webb and John Donnelly from DIA in providing their comments and assistance in understanding capital construction guidelines. Finally I would like to note the assistance provided by Laura Johnston from the Union of Ontario Indians in providing very useful information.

HOW TO BUILD A SCHOOL:

THE PROCESS OF CAPITAL FUNDING

Introduction

What do the Multi-Year Operational Plan, the Responsibility Centre Manager, the Commitment Liquidation Report and

$$\sum_{j=0}^n \frac{b_j}{(1+i)^j} = \frac{b_0}{(1+i)^0} = \frac{b_1}{(1+i)^1} + \dots + \frac{b_n}{(1+i)^n}$$

have in common? They may all be used in either the determination or the construction of a capital project, like a school.

The purpose of this paper is to try to simplify and identify all the various procedures taken by the federal government to approve, construct and evaluate a capital project, which in this case is a school.

The approach involves extracting the basic information provided in a number of government publications which detail how the system works. Then the various elements are divided into specific chapters. The sequence of the chapters will show the reverse of the process of approval. Thus the first chapter explains how the Prime Minister and his Cabinet determine where and why how much money goes to what department. The final chapter explains the concept of benefit-cost analysis or, in other words, whether the benefits of building a school on a given reserve are equal to or greater than the costs.

It is important to remember that the descriptions of the stages have been intentionally stripped to their simplest levels. As well, much of what is presented here is how the process of decision-making should happen in theory. As the reader is undoubtedly aware, a theory of how something should work does not always survive against the politics and personalities of those making or affected by decisions.

CABINET COMMITTEES AND ENVELOPES

During the 1970's the Cabinet Committees evolved. There are 5 Cabinet Committees. Each Committee is responsible for a certain number of departments, agencies which are collectively called "envelopes" (see appendix A). There are 10 envelopes.

In order for our school to be built, the money for it as well as all other programs of the Department of Indian Affairs must be approved by the Cabinet Committee to which the department belongs. DIA is in the Social Affairs envelope of the Social Development Cabinet Committee.

The problem, from the point of view of having our school constructed, is whether there are sufficient funds to pay for it. The amount of money available in the Social Affairs envelope is fixed. The amount in the envelope is determined by the senior committee which is the Priorities and Planning Committee which is chaired by the Prime Minister. This committee looks at the money available to the government for the next 5 years. It then decides what is important to the government and allocates the money to the 10 envelopes based on its priorities. Thus it is possible for envelopes in the Economic Development Committee to get more money at the expense of those in the Social Development Committee, the opposite could also be true.

Once the money has been allocated to the envelopes, the departments and agencies in each envelope must try to justify their needs. Along with the Department of Indian Affairs in the Social Affairs Envelope, there are eleven departments and over 2 dozen other Councils and agencies. The Ministers for each of the departments along with the Minister of Finance and the President of the Treasury Board are the members of the Committee. They must choose how much of the fixed funds go to which department, Council, Commission, or Agency.

Hence when DIA submits its budget requirements, the Minister and his officials must argue strongly that they are essential. If they don't certain programs will not get funded because the whole Committee may decide that the C.B.C. is more important than building a school on a reserve. The Globe & Mail described the envelope system as follows:

"...if spending for one programs goes up, spending must go down for another program in the same envelope. This means, for example, that a social program is not sacrificed to expand an economic program; instead economic programs are measured only against each other, and social programs only against other social programs."¹

The C.B.C. and a school on a reserve are both considered social programs.

The Social Development Committee as with all the other committees allocates money to the departments, agencies and commissions depending upon the priorities it sets for itself. These priorities are in turn based upon the more general ones established by the Planning and Priorities Committee.

The priorities are linked with planning. Long range planning is called Multi-Year Planning and Management. Multi-Year Planning involves 4 fundamental elements: the Fiscal Plan, the Strategic Overview, the Multi-Year Operational Plan and the Budget Year Operational Plan.

The Fiscal plan is multi-year in line with total planning. It estimates total expenditures over a number of years which are in line with the policies and priorities of the various Committees. The fiscal plan is updated each September which will include anticipated revenue levels for the immediate year.

The Strategic overview is prepared by departments to allow Ministers to determine whether or not the objectives outlined by their departments conform to the policies and priorities established in the Cabinet Committees. For example, if the DIA's strategy is to emphasize economic development and the Cabinet Committee intends to emphasize education, then theoretically the department must redefine its objectives.

The Multi-Year Operational Plan is the long-term development of program plans as well as allocation of resources. It is designed to project goals, costs and results. The purpose of the plan is to show how a department's programs achieve the policies established by the Cabinet Committee. Our school would probably be included in this plan. It would be shown as one element in improving the level of education of the native people. The Plan is submitted to Treasury Board at the end of March for review and in our case, the Social Development Committee for information.

The Budget Year Operational Plan is basically the upcoming year of the Multi-Year Operational Plan. The money is specifically allocated in this year subject to the approval of the Parliamentary Estimates. The cost of our school would be included in this plan. If the Estimates are approved by Parliament, then DIA can prepare detailed work plans and assign responsibility centres.

In summation, the Prime Minister and his Cabinet through Cabinet Committees establish long-term objectives and goals. The departments of government must prepare long-term plans that conform to the wishes of Cabinet. These plans are subject to change on a yearly basis (see appendix B). However at some point all this mass of planning and people affects the Indian child and his prospects for a good education.

If the Indian People do not pressure Cabinet Ministers, especially those on the Social Development Committee, then money may be shifted away from DIA. If DIA gets less money, then Indian education receives less money and our school would not be built. In order that this little paper continue, though, money is assigned for the construction of a school. It is worth remembering that the decision to build may have been decided 4 years earlier and has only now reached the Budget Year Operational Plan.²

²The main essentials of this chapter are extracted from Guide To The Policy And Expenditure Management System, Cat. No. BT 32-15.1980. D.S.S. Queen's Printer, 1980

BUILDING A SCHOOL

After the Department of Indian Affairs budget has been approved by Parliament, the department can proceed with its plans. Since funds for our school were also approved construction of the school can begin.

When a decision to build a school has been taken, it falls under the PROJECT CONTROL SYSTEM. "The Project Control System has been developed to provide improved control over capital projects with a view to ensuring that the right manager makes the right decision at the right time."³

In other words the Project Control System tells the people responsible for the construction of our school who makes what decision in order that the school can be built as cheaply and efficiently as possible.

Although Cabinet approval allows Treasury Board to approve the construction of the school, the idea of building it may have been decided years before. This decision is based on what is called project identification, that is a need is determined, alternatives are presented and the one seen as the most effective is chosen. This decision is to be based on a consultation with the bands. The Department manual states, "The Band...is in most cases the end-user of the facility and must be involved in all phases of the project on a continuing basis."⁴

The manual lists the minimum roles for band involvement as,

- 1) identification of user requirements;
- 2) approval at critical phases in the Project;
- 3) identification of Band resources available for project implementation;
- 4) acceptance of the facility and preparation for operation and maintenance of a facility which is to be operated and maintained by the Band;
- 5) participation in evaluation of the project.

Thus if the band is not asked if it needs a school; if it does not have a say in the construction; if it is not asked what the Band can contribute in men and/or material; if members of the Band are not trained or the resources not available to maintain the school; and if the Band has no say in the final evaluation report on the project itself, then the Band is not being completely involved according to the Department's own manual.

The building of our school goes through 5 phases (see Flow Chart, appendix C).

- 1) Project identification
- 2) Project planning
- 3) Design
- 4) Construction
- 5) Evaluation

³B.F. Dewis, Project Control System Indian and Inuit Affairs

⁴Our emphasis in underlining; see *ibid*, p.5

The department breaks each of these phases down into subsegments which it calls milestones. (However for our purposes these are not particularly important.) They indicate the major steps within each phase.

Project Identification

As we had said earlier, the first part of project identification is to determine a need, by consultation with the Band then list the available alternatives and finally choose the one which appears most suited to the needs and resources of the band affected.

The government official most responsible for this stage is called the Responsibility Centre Manager (R.C.M.). The government defines an R.C.M. as,

"an individual who is delegated authority to manage financial resources, including responsibility for determining financial requirements, controlling costs in relation to operational requirements, controlling costs and exercising spending authority to approve charges against his budget."⁵

Moreover an R.C.M. can be subordinate or supervisory. Thus the Superintendent of Education is a subordinate R.C.M. to the District Manager who is his supervisory R.C.M. but who in turn is a subordinate R.C.M. to the Regional Director General.

In the case of our school, the decision to construct is based on consultations between the band and the District Superintendent of Education. Yet after the identification of needs has taken place, the Responsibility Centre Manager may shift from the District Superintendent of Education to the Regional Director of Education. He has the responsibility for preparing the "Project Initiation Document" and submitting it through the various bureaucratic levels. Once approval has been received the R.C.M. is again the District Superintendent of Education. This will be discussed in greater detail later.

The R.C.M., in the first phase, identifies need based on consultation with the Band and program personnel. He then assesses the options available, using advice from personnel in Planning and Engineering and Architecture on technical aspects of the proposal. The Project Initiation Document is prepared, a number assigned and our school is then incorporated into the 5 year plan conditional upon the approval of the Assistant Deputy Minister.

After these steps or milestones have been completed, a Project Manager (PM) is appointed. The government defines a project manager as a "specialist" Cost Centre Manager (CCM) whose responsibility is to control costs as well as the physical progress for projects assigned to him. The Project Manager is appointed by the Regional Director of Engineering and Architecture.

The Project Manager must develop all the preparatory details of our school including design, resources needed and the time frame required to build it. The plans are then given to the R.C.M., the Band and the Regional Director Engineering and Architecture for approval. The approval must also be updated to conform to the details and costs listed in the 5 Year Program Forecast. Since it is a school, a large capital project, it must also receive Treasury Board approval.

⁵ — Manager's Guide to BCS/EAS, March 1981, Exhibit A

Project Planning

The title indicates what takes place. The project manager initiates various studies which result in a detailed development plan. Studies would include site studies, operation and maintenance requirements as well as environmental impact studies.

The result of these efforts is the Project Brief. The Brief includes the final estimate of needs for the design and construction of the school; an economic analysis of alternatives; and the method of construction and labour (day, contract, etc.) which is determined in consultation with the R.C.M. and the Band.

The Project Brief is reviewed by the R.C.M., the Band and the Regional Director of Engineering. If approved and in accordance with the 5 Year Program Forecast it moves on to the next phase.

Design Phase

The design phase commences when the Project Manager arranges an award for the contract design to consultants. Depending on the amount it will cost, a Treasury Board submission may be required.

A preliminary number of designs for our school are prepared. Review and selection by the Band, R.C.M., P.M., and R.D.E. & A. take place.

Project costs and details are entered which are to be included in the Department of Indian Affairs' Main Estimates for September in order to allow construction to commence the following year.

Eventually a completed design is achieved with specifications, bill of material, etc. This design is approved by the same group noted above and written authority for construction to commence is given.

Prior to detailing the next phase, it is important to realize that the consultants who design our school have limitations placed on them by Treasury Board. Not only is overall cost a factor, but Treasury Board also has a formula for the size of a school as well as a formula for calculating costs dependent on distance from a major centre.

According to Vince Webb of DIA, the reason Treasury Board instituted space accommodation standards for schools was because during the sixties DIA had built some very large schools for Bands in western Canada which have never been fully used. The space accommodation standards can be seen in appendix D. However an internal review done by senior DIA officials suggests that Provincial standards were too costly so the department lowered its standards.

The tables come from DIA Engineering and Architecture report DRM 10-7. In addition to area, there are recommended heights for ceilings, requirements for a five year community enrolment projection, area limitations on optional facilities such as Library Resource Centre, Arts and Crafts Room, etc.

For those readers aware of government guidelines such as the Post-Secondary Education Assistance Plan and the Occupational Skills Training Program⁶ the style and restrictions are similar. Yet the guidelines state,

⁶Copies of these guidelines and the Indian alternatives are available through OIEC.

"...it is also the intent of these standards to allow flexibility and choice in designing schools and the provision of education facilities."⁷

The two concepts most important to the construction of our school are gross area and net area. Gross area is determined by using the outside dimensions of the building. Net area is the inside dimensions of teaching space such as classrooms, library, administrative area, gymnasium, showers, etc. However net area does NOT include walls, partitions, halls, washrooms, janitor's storage, cloakroom space or lockers, etc. The manual stipulates that in the school design that the net area be at least 65% of the gross area in schools with 8 classrooms or less; and 70% for schools with more than 8 classrooms. Therefore if a Band Councillor wishes to find out how many square feet or metres are allocated to teaching space, the formula is:

Gross allowable area (provided by the tables in appendix D) x the net to gross ratio (ie 65% or 70% as above) = NET AREA.

These then are some of the limitations placed on the size of our school.

Another costing formula the department uses is distance from urban centres. This involves two phases. Funding at the regional level is based upon the on-reserve population of the total regional Indian population. The amount of money is also determined by the national buying power of the construction dollar as well as the increased costs associated with distance from an urban centre within the region. For purposes of capital construction, there are three main divisions, urban, rural and remote.

An urban area is considered the surrounding land to an urban centre with a population of 10,000 or more.

Rural is defined as that area 40 miles or more from an urban centre but which is located within the Canada Land Inventory Boundaries and there is at least one accessible road to the urban centre.

In calculating the national buying power of the construction dollar; the cost for construction in Urban Ontario under NORMAL conditions is assumed to be the base or 1.00. Since our school is being built in Ontario the national average cost of construction will not be altered. If however the school was being built in B.C. then costs that would be determined in building a school in urban Ontario would have to be multiplied by 1.21, indicating higher costs in B.C. On the other hand, in Nova Scotia costs would be lower and the multiplier is .94.

The other cost element that must be calculated is the distance from an urban centre. Our school will be in a rural area. An example of a rural reserve is Cape Croker. In order to predict an average cost of construction for a rural reserve, DIA multiplies the urban cost by 1.23. In a remote area the multiplier increases to 1.73. In both cases the multiplier is for non-residential buildings. The multiplier for residential construction varies a bit depending on the degree of remoteness.

As a simple example let the following be the costs for the construction of a school. The costs are assumed to be how much on average it takes to build a school in downtown Toronto (excluding land purchase).

⁷Op. Cit.

	TORONTO	ONT. RURAL RESERVE	B.C. RURAL RESERVE
Labour	\$100	(x1.00 x1.23) \$123	(x1.23 x1.23) \$148.83
Materials	250	307.50	372.07
Administration	50	61.50	74.41
TOTAL COST	\$400	\$492.00	\$595.31

Thus on average to construct a school on a rural reserve in Ontario is nearly \$100 or 25% more expensive than in the city while in B.C. it is nearly \$200 or 50% more expensive.

There is one other multiplication consideration. As we have seen so far, the design, acceptance and construction of a school takes many years, not one. Since inflation causes one dollar to purchase less and less with each succeeding year, there has to be upward adjustment in costs to reflect the reduction in buying power.

Treasury Board demands that in submitting a project proposal that the cost over the period it takes to construct the school be done in constant dollars (that is NO inflation calculated) and current dollars (with inflation added). As an example let us take the cost of our school in Toronto, the Ontario Rural Reserve and the B.C. Rural Reserve. We shall assume that it takes 4 years to build the school and the cost is evenly distributed over the 4 year period.

TORONTO

	<u>CONSTANT DOLLARS</u>	<u>INFLATION ADDED</u>	<u>CURRENT DOLLARS</u>
CURRENT YEAR	\$100	X 100%	= \$100
YEAR 2	100	X 109	= 109
YEAR 3	100	X 120	= 120
YEAR 4	<u>100</u>	X 132	= <u>132</u>
TOTAL PROJECT COST	\$400		\$461

ONTARIO RURAL RESERVE

CURRENT YEAR	\$123	X 100%	= \$123
YEAR 2	123	X 109	= 134.07
YEAR 3	123	X 120	= 147.60
YEAR 4	<u>123</u>	X 132	= <u>162.36</u>
TOTAL PROJECT COST	492		567.03

B.C. RURAL RESERVE

CURRENT YEAR	\$149	X 100%	= \$149
YEAR 2	149	X 109	= 162.41
YEAR 3	149	X 120	= 178.80
YEAR 4	<u>149</u>	X 132	= <u>196.68</u>
TOTAL PROJECT COST	\$596	12	\$686.89

Thus we can see the effect of inflation on costing. Obviously if funding for the project is adjusted accordingly there should be no problem. However if the funding is based only on constant dollars then it is possible the project may never be completed or worse be of inferior quality.

Thus we have our design and its limitations based on cost and size criteria. The design approval, like the other phases, is subject to the R.C.M., the Band and the Regional Director of Engineering and Architecture. The design approval at this stage is classified as an "A" estimate. The stage is now set for the actual construction of our school.

Construction Phase

The construction phase is divided into several essentially self-explanatory stages. They are the Tender Call, Tender Closes Contract awarded, Day Labour Plan approval, construction started, interim evaluation, construction completed.

Tender

The Tender Call initially involves the preparation of the specifications, drawings, conditions, etc., based upon the approved design. When the Tender is closed, a review of all the submissions takes place with revision and clarification where necessary. Once a bid has been approved by DIA, it is submitted to Treasury Board for their approval. Once they okay the bid the contract is awarded.

Day Labour Plan

The Day Labour Plan is the responsibility of the Project Manager. He must ensure that the cash flow, manpower requirements, site security and insurance coverage, material requirements and the approval of the overall plan by the band are in order.

Construction

The actual construction takes place. By this time the project manager has made sure the day labourers, sub-contractors, material purchases and on site job supervision are functioning according to the detailed work plan. The PM is also responsible for keeping costs in line, controlling inventory, preparing operation and maintenance activities.

The main phase of actual construction of our school is achieved when the Band, the consultant on construction supervision, representatives from Education and Engineering and Architecture along with the Project Manager review the project to date. The review leads to Interim Acceptance Certificate noting deficiencies, incomplete work, etc.

Final completion is attained when the incomplete work observed in the Interim certificate has been completed to the satisfaction of the above mentioned people and the R.C.M. It should be noted that the Band as user and/or operator of our school has major say as to whether or not to accept it - at least as described in the DIAND manual. If the Band and the others involved find it acceptable, a Certificate of Completion is issued. All the relevant data for the school's construction including drawings, warranties, keys and operators manuals are carried out.

Evaluation

The evaluation is intended to compare the planned costs and time frame with the actual costs and time taken to construct the school. The evaluation will also include how the users have accepted the school in the short-term (1-3 months after completion) and over a one year period. Recommendations for future action would also be included.

Those involved in the final evaluation include the Band, the Responsibility Centre Manager, the Project Manager and the Regional Director, Engineering and Architecture. These people will provide an assessment of our newly-completed school. But was our school worth building in the first place. One method frequently used to help make such a decision is Benefit-Cost Analysis. This is what we will deal with in our next chapter.

BENEFIT-COST ANALYSIS

"Benefit-Cost Analysis is a method of evaluating the relative merits of alternative public investment projects in order to achieve efficient allocation of resources. It is a way of identifying, portraying and assessing the factors which need to be considered in making rational economic choices."⁸

In short, Benefit-Cost Analysis is a method to determine the better alternative. In our case it would be whether or not it is more beneficial to the band to build a school or to send them to a provincial school with any savings put towards some other activity on the reserve.

Before proceeding, it is important to emphasize that Benefit-Cost Analysis is not the only criterion as to whether a school should or should not be built. As one economist stated, "...the economist helps the government (or band) to make the decision that the government should make, rather than trying to make the decision himself... What is important is what comes out of a well-organized political process in which many bureaucrats and many legislators will participate."⁹

What he is saying is that even if a benefit-cost analysis shows that it is better not to build our school, it is up to the Chief and Band Councillors in consultation with the people to make the final decision on construction.

The Concept of Present Value

Before proceeding any further the idea of Present Value needs to be understood.

The formula for present value is $\frac{1}{(1+i)^j}$ where $n1$ = Value
 i = Social Discount value
 j = time

In the business world this formula, sometimes referred to as the present discounted value allows the businessman to determine the worth of buying a capital good such as a machine which provides a constant return on his investment. The machine provides a rental income of \$100 per year and it will last 20 years. Thus the total income is \$2000 but in 20 years the same as \$2000 now. The answer is no. A true representation requires he look at the present market interest rate which is a hypothetical 6%. He would then take the formula,

$\frac{1}{(1+i)^j}$ where $1 = \$100$, $i = .06\%$ and $j = 1$ and $\frac{n1}{(1+i)^1} + \frac{n2}{(1+i)^2} + \dots + \frac{n20}{(1+i)^{20}}$

do it 20 times or the value of that \$2000 in Present Discounted Value will actually be \$1,147. Thus the businessman knows what his return on his investment is in constant dollars.¹⁰

⁸ ——— Benefit-Cost Analysis Guide, Treasury Board Secretariat March 1976, Cat. No. BT-35-2-1976

⁹ Samuel B. Chase (ed) Problems in Public Expenditure Analysis, (Washington, D.C.: Brookings Institution, 1968)

¹⁰ P. Samuelson, A. Scott, Economics (Toronto McGraw-Hill) p.734-738

Benefit-Cost Analysis allows benefits and costs of a public investment to be compared on one level, that of dollars and cents. The starting point in calculating the dollars and cents is the marketplace. Thus the capital cost of a school is easily determined because prices of material and labour are already determined by the marketplace.

The benefits that result from the construction of the school are more difficult to determine. An example of benefit may be the use of the school as a place for members of the band thereby avoiding the need to build a separate community hall. However the most obvious benefit is the education of both the children and adults. We make the assumption that a school on the reserve is more beneficial to members of the band than having to travel off the reserve to attend school. The dollars value of education will be discussed later.

It is important to note what is called "non-efficiency objectives" which is translated as social items that cannot be given a dollar value. Such items might, for example, be the pride a band has in having its own school.

It may be useful to list some of the costs and benefits associated with the construction of a school.

COSTS

Construction cost
Maintenance cost of the school

BENEFITS

Employment of construction labourers,
teachers, teacher aides, maintenance
staff*

Improved education for the people

Pride of ownership

This list does not pretend to be complete but it provides an example of how costs and benefits may be categorized.

Once the costs and benefits have been determined, they have to be compared. Obviously the bulk of the costs will come at the beginning while the benefits take place over a much longer period of time. This is where present value enters using the discount rate (i), like the businessman in our earlier example.

The Treasury Board Guide deals in some depth on the question of the social discount rate and the distinction between the social opportunity cost rate and the social time preference rate.¹¹ However for our purposes it is important only to note that the Guide recommends social discount rates of 5, 10 or 15% depending on the project. These will be calculated with constant dollars.

At its simplest net present value is adding all the discounted benefits and then subtracting all the discounted costs. If after adding and subtracting the result is positive or greater than zero then the project should proceed.

Let us use the example of our school.

¹¹Op.Cit.

*assumes the alternative is unemployment.

Let $b_0, b_1, b_2 \dots b_n$ = benefits (ie salaries of teacher, etc) where 0,1,2, are the years in which they are realized.

Let $c_0, c_1, c_2 \dots c_n$ = costs (ie construction and maintenance costs of the school) and again where 0,1,2,...are the years in which they are realized.

i = the social discount rate (as we have already said)

Then to add up all the benefits over a 25 year life-span of the school, the formula would be where Σ = sum of, j = time in years starting with 0, n = cumulative value of nominator.

$$\sum_{j=0}^n \frac{b_j}{(1+i)^j} = \frac{b_0}{(1+i)^0} + \frac{b_1}{(1+i)^1} + \frac{b_2}{(1+i)^2} + \dots + \frac{b_{25}}{(1+i)^{25}}$$

So too with the costs,

$$\sum_{j=0}^n \frac{c_j}{(1+i)^j} = \frac{c_0}{(1+i)^0} + \frac{c_1}{(1+i)^1} + \frac{c_2}{(1+i)^2} + \dots + \frac{c_{25}}{(1+i)^{25}}$$

Then in order to find the net present value, we subtract cost from benefits for each year or,

$$\sum_{j=0}^n \frac{b_j}{(1+i)^j} - \sum_{j=0}^n \frac{c_j}{(1+i)^j} = \sum_{j=0}^n \frac{(b_j - c_j)}{(1+i)^j} = \frac{(b_0 - c_0)}{(1+i)^0} + \frac{(b_1 - c_1)}{(1+i)^1} + \frac{(b_2 - c_2)}{(1+i)^2} + \dots + \frac{(b_{25} - c_{25})}{(1+i)^{25}}$$

Notice that each calculation is done for each separate year and then added together. As we said earlier if the final number (indicated by parentheses on top) is greater than zero, then the project has positive net present value and may be recommended to be built.

Another type of indicator is the benefit-cost ratio. If the ratio is greater than unity or 1, then the school should be built. This ratio is achieved by taking the above mentioned benefits and dividing them by the costs or,

$$\sum_{j=0}^n \frac{b_j}{(1+i)^j}$$

$$\frac{\sum_{j=0}^n \frac{b_j}{(1+i)^j}}{\sum_{j=0}^n \frac{c_j}{(1+i)^j}}$$

There is one other figure that is used in deciding action through benefit cost analysis. This is called the internal rate of return. The internal rate of return is that number which causes the present value of benefits when the present value of costs are subtracted to equal zero or: r = internal rate of return

$$\sum_{j=0}^n \frac{b_j}{(1+i)^j} - \sum_{j=0}^n \frac{c_j}{(1+i)^j} = 0$$

When the social discount rate (i) is less than the internal rate of return (r) then the project, our school for example, has positive net present value - in other words the school should be built - otherwise it has negative net present value.

Net present values, benefit-cost ratios and internal rates of return are only the formulae for benefit-cost analysis. The difficult part is giving each of the letters or variables in the formulae correct values or dollars, percentages and years. Here we are only interested in showing the rough outlines of how benefit-cost analysis works.

Education and Benefit-Cost Analysis

Before leaving the subject of Benefit-Cost Analysis it may be of some value to look briefly at its use in assessing the value of education. Earlier we had said that in building a school, construction costs are easily determined by the market value of materials and labour. We also said some of the benefits of the school can be determined by the wages of those employed. The wages and salaries are again based on their market value. But how are the costs and benefits of education determined?

Although there have been a number of studies done on elementary education using benefit-cost analysis, most are American studies done years ago. Consequently we are forced to use a very recent study done by Dr. David Stager of the University of Toronto.¹² This study concentrates on post-secondary education using benefit-cost analysis. The study was done for the Labour Market Development Task Force.

His formula is the same as the one we discussed earlier, that is

$$NPV = \sum_{t=1}^n \frac{bt}{(1+i)^t} - \sum_{t=1}^m \frac{ct}{(1+i)^t}$$

NPV = Net Present Value at the age of enrolment into the program (e.g. when he/she enters university)

$\sum$ = sum of

n = the number of years the individual is earning money (ie benefits)

m = the number of years the individual is at school (ie lost earnings or cost)

bt = is the adjusted earnings differential in year t, in other words the difference between what an average high school graduate earns and that of a college graduate in a given year

ct = the total cost per student in year t

i = the selected discount rate

Thus Dr. Stager's approach is essentially to see how much more a college graduate will earn over his working lifetime after subtracting post-secondary educational costs than someone who only has a high school diploma. This is shown schematically in Graph I, appendix E.

There are obvious limitations. For example the calculations of earnings are based on surveys of individuals. The surveys and the responses by individuals may be questionable as accurate indications of earnings. Another argument is that the

¹²Dr. David Stager, "Federal Involvement in Post-Secondary Education For Highly Qualified Labour" "Technical Study 35, Labour Market Development Task Force, July, 1981 (MSS Cat. No. MP 15-4/35-1981 E) p.103-125

more people who attend post-secondary education the lower the earnings of graduates are. Furthermore this approach excludes valuation of such concepts as 'personal betterment' leadership' etc. One final argument among the many presented in Dr. Stager's work was that college graduates up the requirements but not the quality of positions by pushing out those who don't possess the same level of education.

Dr. Stager notes that the evidence is incomplete but the direction is clear. Since the late sixties and early seventies the social rate of return (discussed earlier essentially money benefits from attending college) have been dropping. In discussion with him, he stated that over the past ten years the social rate of return has dropped from 18-20% to under 10% and appears it will continue to decline well into the next decade. However his study emphasizes that the rates of return vary widely from one degree to the next with dentistry having the highest return, followed by law, medicine and then the arts and sciences.

Again while in discussion with Dr. Stager, I mentioned the possible social rate of return for Indian people who attended college. He was reluctant to comment on the social rate of return without having any empirical evidence. But he felt that since the level of formal education was much lower amongst Indian people and the alternative was often unemployment, then the social rate of return could be double that of the majority population. However he stressed this was only a guess. He also noted that studies done in the United States showed occupational skills training programs had social rates of return from anywhere between 0 and 300%.

It would seem logical that the social rate of return decreases as the educational level increases; that is to say the rate of return is higher for a grade school graduate relative to one who has no formal education than the difference between a high school and college graduate. However this writer cannot at present prove such a statement.

Nevertheless it seems fairly evident that at whatever level education the Indian child or adult obtains, the benefits definitely outweigh the costs.

CONCLUSION

This report has tried to identify 3 major elements involved in capital construction. One, how decisions are taken at the highest political levels which would determine how much money is available for Department capital programs. Two, the steps involved in building a school or other major capital project. Finally one means of determining whether the project is worthwhile.

These three chapters lead us to make three recommendations:

- 1) To increase capital allocations within DIA as well as overall funding for the Department, political lobbying should be towards Ministers on the Social Development Committee as listed in appendix A.
- 2) When capital construction takes place on a reserve whether it is a school or any other project, it is recommended the band should be aware of and exercise fully its rights in every phase of the project, from planning through to final evaluation. This role is clearly stipulated in the Guidelines.
- 3) It is recommended that where possible a band should have a benefit-cost analysis done on capital projects in order to have at least one yardstick to measure the value of the project.

None of the above guarantee a successful project but it should allow the band to have greater input and control over the outcome of the final product. In the same way, we hope this report will help Indian people understand more fully some of the processes involved in building a school.

APPENDIX A

CABINET COMMITTEES AND POLICY SECTOR RESOURCE ENVELOPES

CABINET COMMITTEE - PRIORITIES AND PLANNING

SOCIAL AFFAIRS ENVELOPE (Ministers as of January 1, 1982)

Communications (Hon. Francis Fox)

- Arts and Culture
- Canada Council
- Canadian Broadcasting Corporation
- Canadian Film Development Corporation
- Canadian Radio-Television and Telecommunications Commission
- National Arts Centre Corporation
- National Film Board
- National Library
- National Museums of Canada
- Public Archives
- Social Sciences and Humanities Research Council

Employment and Immigration Department (Hon. Lloyd Axworthy)

- Advisory Council on the Status of Women
- Immigration Appeal Board
- Status of Women - Office of the Co-ordinator

Environment (Hon. John Roberts)

- Environment Programs

Indian Affairs and Northern Development (Hon. John Munro)

- Northern Canada Power Commission

Labour (Hon. Charles Caccia)

- Canadian Centre for Occupational Health & Safety Fitness and Amateur Sport

National Health and Welfare (Hon. Monique Begin)

- Medical Research Council

Public Works (Hon. Paul Cosgrove)

- Canada Mortgage & Housing Corporation

Secretary of State (Hon. Gerald Regan)

Social Development - Ministry of State (Hon. Jean Chretien)

Treasury Board of Canada (Hon. Donald Johnston)

- Student, Youth and Other Employment

Veteren's Affairs (Hon. Bennett Campbell)

APPENDIX B

EXPENDITURE MANAGEMENT - MAJOR STEPS RELATING TO 1986-1987 FISCAL YEAR

CALENDAR YEAR	STAGE OF EXPENDITURE PLANNING FOR 1986-87	ACTION FOR 1986-87
1982		
1. September	Planning-Year 3	. initial establishment by Priorities and Planning Committee of total expen- diture and policy sector envelope levels in Fiscal Plan
1983		
2. September	Planning-Year 2	. review of Fiscal Plan . initial establishment of departmental levels within policy sector envelopes . policy and program changes initiated as required
1984		
3. September	Planning-Year 1	. review of Fiscal Plan . policy and program changes initiated as required
1985		
4. June	Upcoming Year	. Targets established for Estimates formulation
5. September	Upcoming Year	. review Fiscal Plan . policy and program changes initiated as required
6. November	Upcoming Year	. Main Estimates approved
1986		
7. February	Upcoming Year	. Main Estimates tabled
8. September	Current Year	. review of Fiscal Plan including status report and outlook for Current Year
9. November	Current Year	. First regular Supplementary Estimates tabled
1987		
10. March	Current Year	. Final regular Supplementary Estimates tabled

APPENDIX D

ELEMENTARY ACCOMODATION (TABLE I)

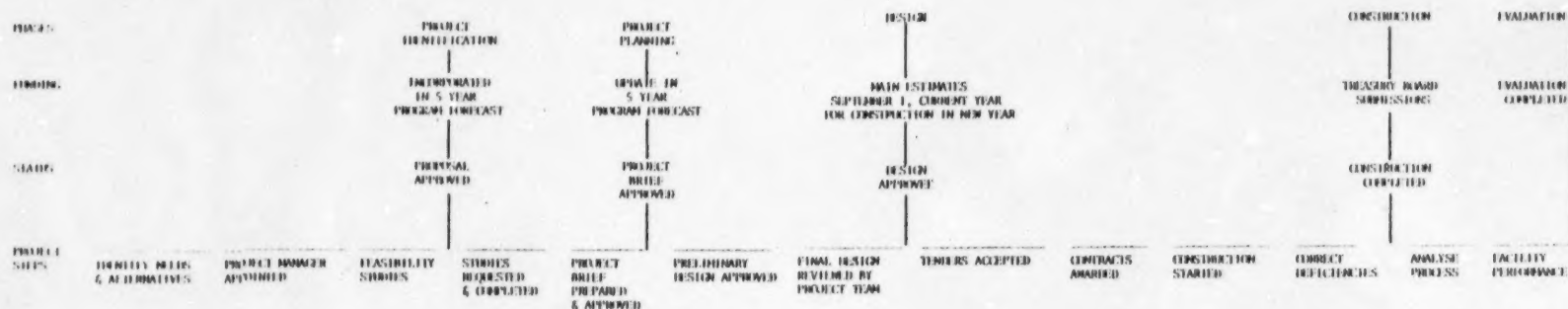
(Grade 1 to Grade 9)

Elementary Enrolment (Pupils)	Number of Standard Classrooms	Allowable Maximum Gross Floor Area	
		(m ²)	(ft ²)
10 - 34	1	144	(1,600)
35 - 60	2	351	(3,900)
61 - 86	3	513	(5,700)
87 - 112	4	675	(7,500)
113 - 138	5	927	(10,300)
139 - 164	6	1125	(12,500)
165 - 190	7	1377	(15,300)
191 - 216	8	1566	(17,400)
217 - 242	9	1764	(19,600)
243 - 268	10	1962	(21,800)
269 - 294	11	2160	(24,000)
295 - 320	12	2358	(26,200)
321 - 346	13	2556	(28,400)
347 - 372	14	2754	(30,600)

Note: (1) For enrolments in excess of 372 pupils, 7.9m² (86 ft²) may be added for each additional elementary pupil.

(2) Refer to paragraph 2.2. when calculating the additional classrooms and corresponding increase in the gross area allowed for kindergarten enrolment.

PROJECT ACTIVITY FROM CONCEPT



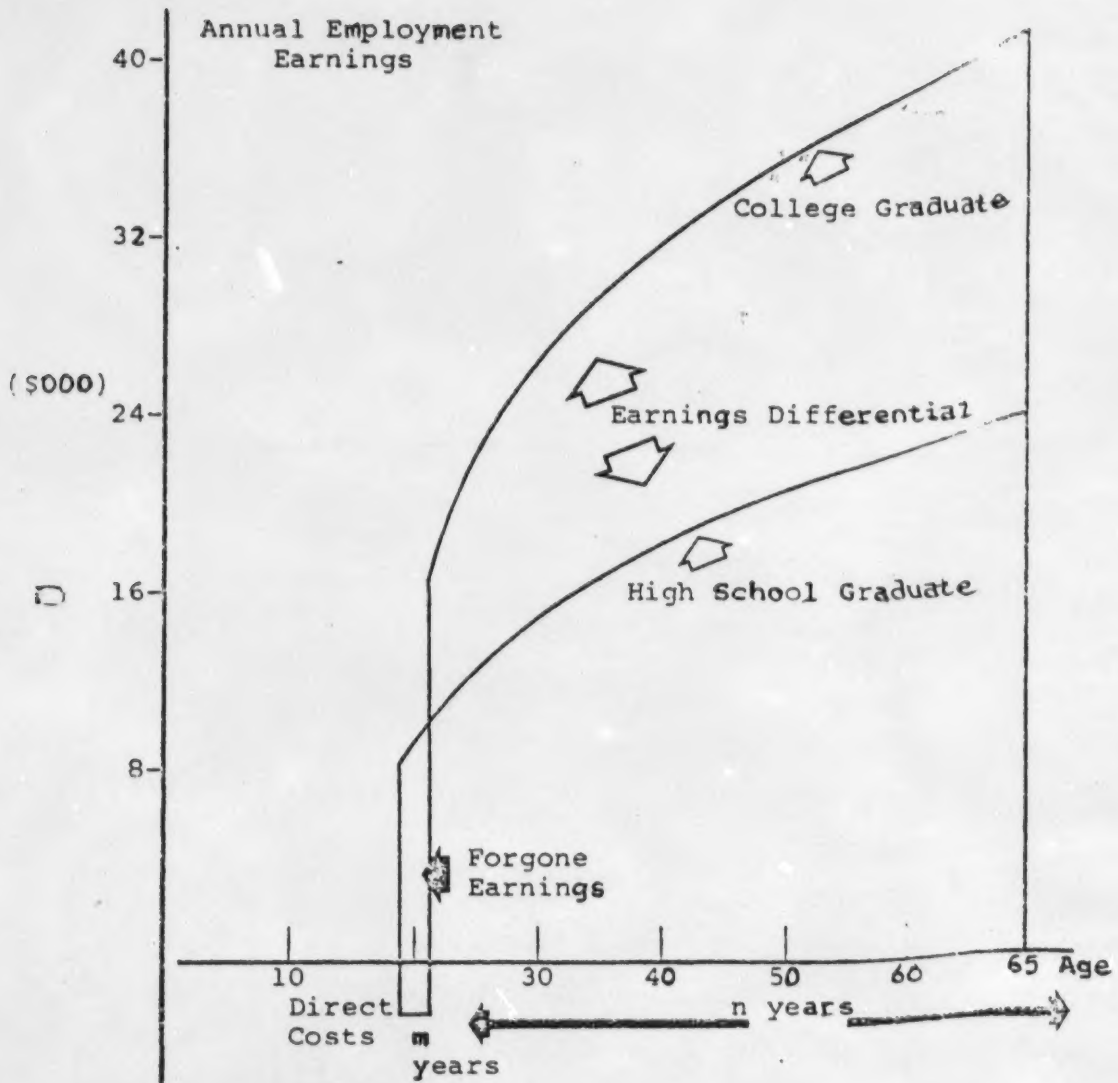
APPENDIX D

SECONDARY ACCOMMODATION
(Grade 9 to Grade 12)

Secondary Enrolment (pupils)	Number of Standard Classrooms	Allowable Maximum Gross Floor Area	
		(m ²)	(ft ²)
10 - 23	1	198	(2,200)
24 - 46	2	405	(4,500)
47 - 69	3	594	(6,600)
70 - 92	4	792	(8,800)
92 - 115	5	990	(11,000)

Note: For enrolments in excess of 115 pupils, 9.3m² (100 ft²) may be added for each additional secondary pupil.

GRAPH I



HYPOTHETICAL LIFETIME EARNINGS PROFILES
FOR HIGH SCHOOL AND COLLEGE GRADUATES

FIGURE 1

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